Leptospirosis

(Also known as Weil Disease, Hemorrhagic Jaundice, Mud Fever, Swineherd Disease, Canicola Fever)

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1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Leptospirosis is a bacterial disease caused by the spirochetes of the genus *Leptospira.*

B. Clinical Description

The clinical course of leptospirosis is dynamic and often consists of two phases. Initial onset is usually abrupt, with nonspecific constitutional symptoms of fever, chills, headache, severe muscle pain (calves and thighs), conjuctival suffusion (watery eyes), and malaise. Gastrointestinal tract symptoms and a rash can also occur.

Subsequently, the patient can have hepatic involvement (abnormal liver function tests, enlargement of the liver, jaundice, and liver failure), renal involvement (abnormal urinalysis, presence of nitrogen-containing compounds in the blood, and renal failure), cardiovascular involvement (hemolytic anemia, hemorrhage into skin and mucous membranes, and myocarditis), pulmonary involvement (with or without coughing up of blood), and central nervous system involvement (aseptic meningitis and altered mental awareness). Inflammation of certain muscle groups is common. Conjunctival suffusion, the most characteristic physical finding, occurs in less than half of patients.

Asymptomatic infections can occur, and disease severity depends on the infecting serotype. “Weil disease” refers to severe leptospirosis with jaundice. Duration of illness varies from less than 1 week to 3 weeks or longer. Antibiotics appear to shorten the course of illness and reduce the frequency of convalescent leptospiruria (shedding the agent in the urine). Without treatment, recovery may take several months. The case-fatality rate is low, but it increases with age.

C. Reservoirs

Wild and domestic animals are the reservoir for leptospirosis. Many animals have prolonged leptospiruria without suffering from the disease themselves. The infection is common in rodents, livestock (cattle, horses, sheep, goats, swine), canines, and wild mammals.

D. Modes of Transmission

After a short period of circulating high levels of the spirochete in their blood, animals shed the spirochete in their urine, contaminating the environment. The infection in humans and animals is contracted by direct or indirect contact of nasal, oral, or eye mucosal membranes or abraded or traumatized skin with urine or carcasses of infected animals. Indirect exposure through water, soil, or foods contaminated by urine from infected animals is the most common route. Inhalation of droplet aerosols of contaminated fluids can occasionally occur. Person-to-person transmission is rare.

E. Incubation Period

The incubation period is usually 10 days, with range of 4 to 19 days.

F. Period of Communicability or Infectious Period

Person-to-person transmission is considered extremely rare. Infected animals can spread the disease during the leptospiruria phase, which can be prolonged (1–3 months or longer). Humans with leptospirosis usually excrete the organism in urine for 4 to 6 weeks, but leptospiruria has been observed in humans and in animals for as long as 11 months after acute infection.

G. Epidemiology

In the United States, 100–200 cases of leptospirosis are identified annually, with about 50% of the cases occurring in Hawaii. The disease is considered to be under-diagnosed. Although the incidence of disease in the United States is relatively low, leptospirosis is considered to be the most widespread zoonotic disease in the world, particularly in tropical areas with heavy rainfall and neutral or alkaline soils. The greatest numbers of cases are seen in the summer months after heavy rainfalls or periods of flooding.

Leptospirosis is an occupational hazard for people who work outdoors or with animals (for example, farmers, sewer workers, veterinarians, fish workers, dairy farmers, or military personnel). It is a recreational hazard for campers or those who participate in outdoor sports in contaminated areas, and it has been associated with swimming, wading, and whitewater rafting in contaminated lakes and rivers.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

- Any suspect case of leptospirosis based on a healthcare provider's medical opinion or a positive laboratory result pertaining to leptospirosis. *Note:* See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute (SLI) does not perform testing for leptospirosis but can forward specimens to the Centers for Disease Control and Prevention (CDC). Laboratories should send serum specimens of suspected leptospirosis along with a complete case history to the SLI, Reference Laboratory. Paired serum specimens are preferred, but not required. Contact the Reference Laboratory at (617) 983-6607 for additional information on submission of specimens.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To assess the magnitude of the disease in different areas and among different risk groups.
- To identify outbreaks as soon as possible.
- To identify animal sources of infection.
- To design more effective control and prevention methods.

B. Laboratory and Healthcare Provider Reporting Requirements

Refer to the lists of reportable diseases (at the end of this manual's Introduction) for information.

C. Local Board of Health Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**

Massachusetts Department of Public Health (MDPH) regulations (*105 CMR 300.000*) stipulate that each local board of health (LBOH) must report the occurrence of any case of leptospirosis. Current requirements are that cases be reported to the MDPH Division of Epidemiology and Immunization, Surveillance Program using an official MDPH *Generic Disease Reporting Form* (in Appendix A). Refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**

   a. It is the responsibility of the LBOH to complete a MDPH *Generic Disease Reporting Form* (in Appendix A) by interviewing the case and others who may be able to provide information. Much of the information required on the form can be obtained from the case's healthcare provider or the medical record.

   b. Use the following guidelines to assist you in completing the form:
      1) Record "Leptospirosis" as the disease being reported.
      2) Record the case's demographic information.

3) Record the date of symptom onset, symptoms, date of diagnosis, hospitalization information (if applicable), and outcome of disease (*e.g.*, recovered, died).
4) Exposure history: use the incubation period range for leptospirosis (2–26 days). Specifically, focus on the period beginning a minimum of 2 days prior to the case's onset date back to no more than 26 days before onset for the following exposures:
   a) Travel history: determine the date(s) and geographic area(s) traveled to by the case.
   b) Animal contact: ask the case about potential direct or indirect occupational or recreational exposures to animals. This information can then be documented in the "Comments" section.
5) Complete the import status section to indicate where leptospirosis was acquired. If unsure, check "Unknown." Include any additional comments regarding the case.
6) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

c. After completing the form, attach lab report(s) and mail (in an envelope marked "Confidential") to:
   MDPH, Division of Epidemiology and Immunization
   Surveillance Program, Room 241
   305 South Street
   Jamaica Plain, MA 02130

d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed directly below.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

None.

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of a case. Since a patient with leptospirosis usually excretes the organism in urine for 4 to 6 weeks, proper precautions (gloves, handwashing, etc.) should be used when handing urine or any articles soiled with urine.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

If you suspect an outbreak, investigate clustered cases in an area or institution to determine source of infection and mode of transmission. A common vehicle, such as contaminated water, should be sought and applicable preventive or control measures instituted. Consult with the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines and therefore be difficult to identify at a local level.

D. Preventive Measures

Environmental Measures

To prevent illness, prevent contamination of living, working and recreational areas by urine of infected animals.

- Control rodent populations in areas of human habitation.
- Domestic animal owners should take necessary precautions to minimize their animal's potential contact with wildlife (*e.g.*, do not feed pets outside or allow animals to roam unsupervised).
- Do not allow animals to urinate in or near ponds, pools, or puddles.
- Keep animals away from gardens, playgrounds, sandboxes, and other places children may play.
- Among domesticated animals, vaccination of swine, cattle, and dogs is effective in preventing symptoms of disease, but it does not protect completely against infection and shedding of organisms in the urine.

Personal Preventive Measures/Education
To prevent leptospirosis, the public needs to be educated on how the disease is transmitted and the importance of proper food storage and garbage disposal. They should also be counseled to minimize their contact with fresh water, mud, and vegetation that might be contaminated with the urine of infected animals. If their occupation or recreational activities require such exposure, education on use of personal protective measures (*i.e.,* proper clothing, footwear and gloves) should be given. Additional preventive measures include:

- Always wash hands thoroughly after touching items potentially soiled by an animal's urine.
- Use an antibacterial cleaning solution or a solution of 1 part bleach in 10 parts water to clean areas or items soiled by the animal's urine.
- Doxycycline is effective post-exposure prophylaxis (200 mg/once a week) and should be considered for high-risk occupational groups during periods of high exposure. (See Section 1)G. at the beginning of this chapter for examples of high-risk occupations.) However, indications for doxycycline use in children have not been established. There is no licensed vaccine to prevent leptospirosis in humans.

A *Leptospirosis Public Health Fact Sheet* can be obtained from the Division of Epidemiology and Immunization or through the MDPH web site at <http://www.state.ma.us/dph/>. Click on the "Publications" link and scroll down to the Fact Sheets section.

ADDITIONAL INFORMATION

The following is the formal CDC surveillance case definition for leptospirosis. It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2) A of this chapter. (CDC case definitions are used by state health departments and the CDC to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria in Section 2) A.

Clinical description
An illness characterized by fever, headache, chills, myalgia, conjunctival suffusion, and less frequently by meningitis, rash, jaundice, or renal insufficiency. Symptoms may be biphasic.

Laboratory criteria for diagnosis

- Isolation of *Leptospira* from a clinical specimen, or
- Fourfold or greater increase in *Leptospira* agglutination titer between acute- and convalescent-phase serum specimens obtained ≥2 weeks apart and studied at the same laboratory, or
- Demonstration of *Leptospira* in a clinical specimen by immunofluorescence.

Case classification
Probable: a clinically compatible case with supportive serological findings (*i.e.,* a *Leptospira* agglutination titer of ≥200 in one or more serum specimens). *Confirmed:* a clinically compatible case that is laboratory confirmed.

REFERENCES

American Academy of Pediatrics. *1997 Red Book: Report of the Committee on Infectious Diseases, 24th Edition.* Illinois, American Academy of Pediatrics, 1997.

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CDC Website. Leptosporidiosis: Frequently Asked Questions. Available at <http://www.cdc.gov/ncidod/dbmd/diseaseinfo/leptospirosis_g.htm>. Updated September 2, 1999.

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MDPH. *105 CMR 300: Reportable Diseases and Isolation and Quarantine Requirements*. MDPH, Promulgated November 1998, (Printed July 1999). .